

## CLAIMS

### WHAT IS CLAIMED IS:

- 1           1. A method of making a device comprising:  
2                 forming two electrodes;  
3                 creating an electric field between the two electrodes; and  
4                 forming a waveguide between the two electrodes in the presence of the  
5                 electric field.
- 1           2. The method of claim 1, wherein the two electrodes are lithographically-defined  
2           on a substrate.
- 1           3. The method of claim 2, wherein the waveguide comprises an organic crystal  
2           material.
- 1           4. The method of claim 3, wherein the organic crystal material comprises an  
2           organic molecule comprising:  
3                 a doner portion, and  
4                 an acceptor portion coupled to the doner portion via a conjugated backbone.
- 1           5. An electro-optic modulator comprising:  
2                 two electrodes; and

3 a waveguide disposed between the two electrodes, the waveguide comprising  
4 an organic crystal.

1 6. The electro-optic modulator of claim 5, wherein the organic crystal comprises:  
2 a doner portion, and  
3 an acceptor portion coupled to the doner portion via a conjugated backbone.

1 7. The electro-optic modulator of claim 6, wherein the conjugated backbone  
2 comprises an aromatic ring.

1 8. The electro-optic modulator of claim 7, wherein the aromatic ring is a benzene  
2 ring.

1 9. The electro-optic modulator of claim 5, wherein the waveguide was formed in  
2 the presence of an electric field created between the two electrodes.

1 10. The electro-optic modulator of claim 5, wherein the waveguide is a non-  
2 centrosymmetric organic material with substantially aligned dipole moments.

1 11. The electro-optic modulator of claim 10, wherein the dipole moments were  
2 aligned using an electric field created between the two electrodes.

1 12. A method of making an electro-optic modulator comprising:  
2 forming two electrodes on a substrate;

3 depositing a dielectric layer at least partially between the two electrodes;  
4 creating an electric field between the two electrodes;  
5 forming a waveguide over the dielectric layer in the presence of the electric  
6 field; and  
7 depositing a top cladding over the waveguide.

1 13. The method of claim 12 further comprising:  
2 polishing the waveguide prior to depositing the top cladding.

1 14. The method of claim 13 further comprising:  
2 polishing the waveguide down to a top surface of the two electrodes.

1 15. The method of claim 12, wherein forming of the waveguide further  
2 comprises:  
3 growing a crystal by a controlled cooling of a melt .

1 16. The method of claim 15, wherein the crystal comprises an organic molecule  
2 comprising a donor, an acceptor, and a conjugated backbone.

1 17. The method of claim 12, wherein forming of the waveguide further  
2 comprises:  
3 growing a crystal by controlling a rate of evaporation of a solution.

1           18. The method of claim 17, wherein the crystal comprises an organic molecule  
2 comprising a donor, an acceptor, and a conjugated backbone.

1           19. The method of claim 12, wherein forming of the waveguide further  
2 comprises:

3                   aligning dipole moments of the waveguide with the electric field as the  
4                   waveguide crystallizes.

1           20. The method of claim 12 further comprising:  
2                   applying a voltage to the two electrodes to modulate a light signal in the  
3                   waveguide.

1           21. A method of changing a phase of an optical signal in an electro-optic  
2 modulator comprising two electrodes and an organic crystalline waveguide situated  
3 between the two electrodes, the organic crystalline waveguide having dipole moments  
4 substantially aligned in a common orientation, the method comprising:  
5                   introducing the optical signal into the organic crystalline waveguide; and  
6                   applying a voltage to the two electrodes.

1           22. The method of claim 21, wherein applying the voltage to the two electrodes  
2 changes a refractive index of the organic crystalline waveguide.

1           23. An optical system comprising:  
2                   a laser;

3 an electro-optic modulator comprising two electrodes and an organic crystal  
4 waveguide between the two electrodes, the waveguide having its dipole  
5 moments substantially aligned in a common direction, the waveguide  
6 positioned to receive a light signal from the laser, the electrodes of the  
7 waveguide coupled to a signal input.

1 24. The optical system of claim 23 further comprising:  
2 an amplifier to amplify a modulated light signal from the electro-optic  
3 modulator.

1 25. The optical system of claim 24 further comprising:  
2 a MUX/DEMUX coupled to the electro-optic modulator.

1 26. The optical system of claim 25, wherein the MUX/DEMUX is an array  
2 waveguide grating.

1 27. An electro-optic modulator comprising:  
2 a splitter;  
3 a coupler; and  
4 a phase modulator comprising an organic crystal having its dipole moments  
5 substantially aligned in a common direction, wherein the splitter is  
6 coupled to direct a first portion of a light signal to the phase modulator  
7 and a second portion of the light signal to the coupler, and the coupler

8 is coupled to recombine an optical signal output from the phase  
9 modulator with the second portion of the light signal.

1 28. The electro-optic modulator of claim 27, wherein the splitter and the coupler  
2 are the same device.

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